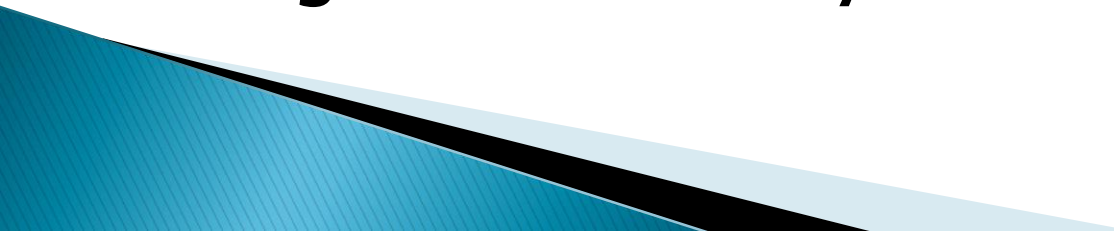


# IRRIGATION MANAGEMENT CONSIDERATIONS FOR CITRUS

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**January 22, 2020**

# Introduction

- ❑ Irrigation management critical for improved citrus production
  - ❑ Optimizing soil health through use of soil amendments seems to be a good strategy for increasing tree performance.
  - ❑ Monitoring soil water, temperature and electrical conductivity is helpful in improving irrigation efficiency.
- 

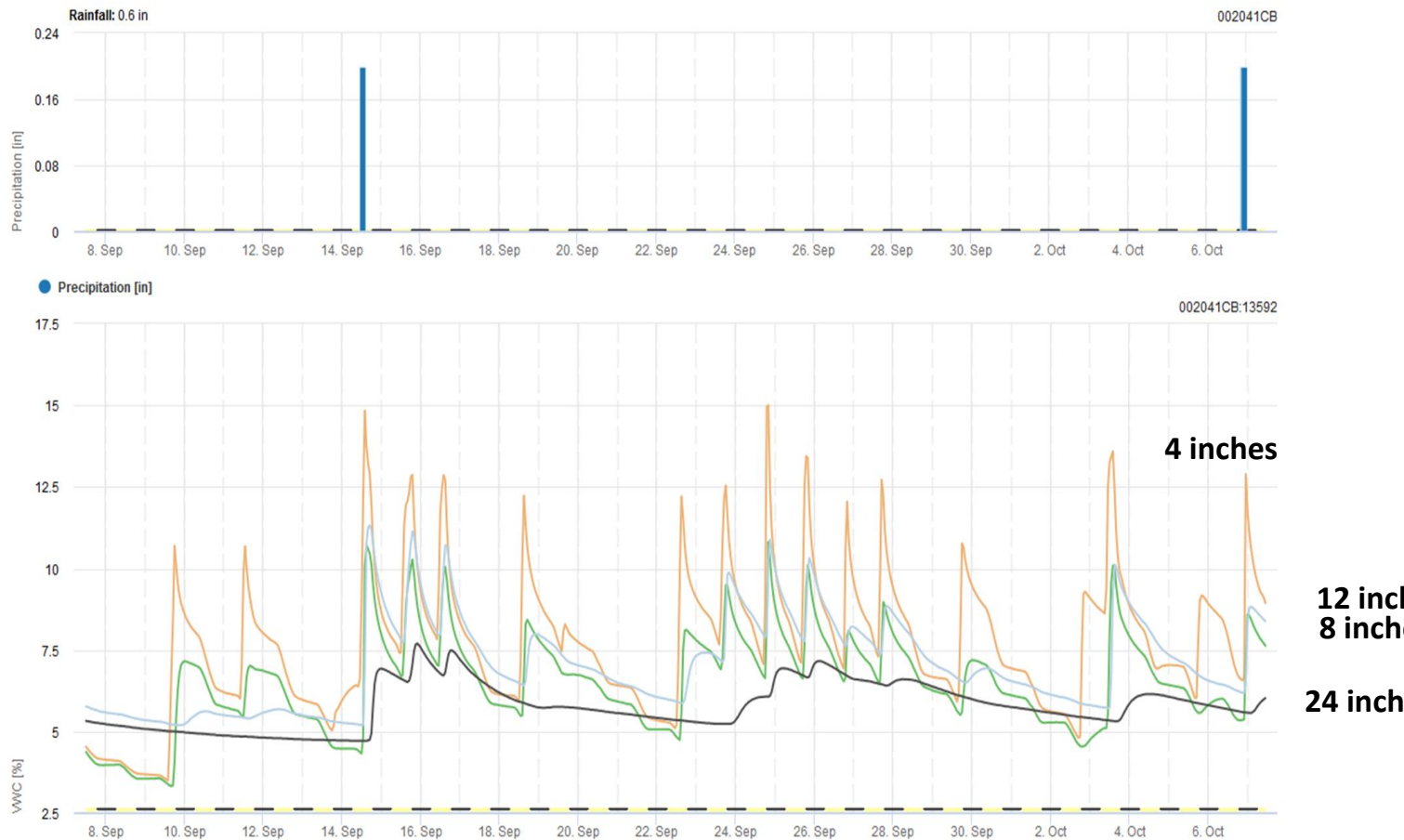
# Promising results on soil amendments and cover crops, observations from Leesburg

Block	Organic matter (%)
Block 1	8.11
Block 2	4.65
Block 3	2.17
Block 4	2.22
Block 5	2.17
Block 6	2.13
Block 7	2.22



# Soil moisture at a grove with 2-5% organic matter with using 2-day irrigation interval

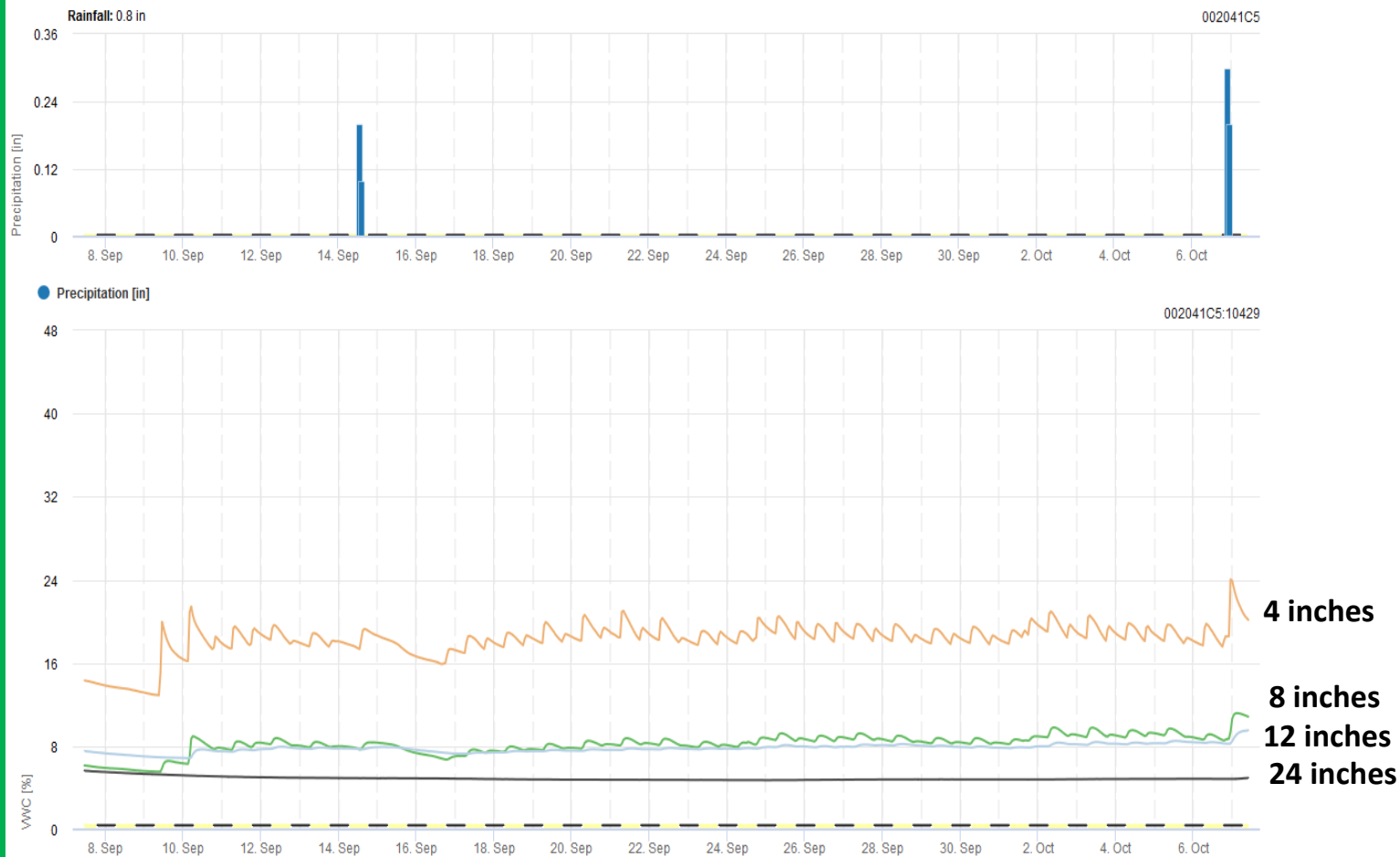
Field capacity at highest level is about 23%.  
Normal field capacity of FL soils is 8-14%.  
Organic matter makes the difference.



Credit: Dr. Juanita Popenoe

# Soil moisture at a grove with 4–8% organic matter with daily irrigation

Field capacity at highest level is about 23%. Normal field capacity of FL soils is 8–14%. Organic matter makes the difference.



U Credit: Dr. Juanita Popenoe

# Benefits of soil amendments

- Reduce compaction and helps water infiltration
- Reduces alkalinity of soil, thus moderating pH.
- Increase the organic matter content of soil
- Help balance the mineral content of the soil, helping with release of cations and anions.
- Buffer saline and toxic soil conditions
- Improve the physical structure of the soil, the way the soil particles are grouped together
- Lessen the amount of irrigation, by improving water storage.

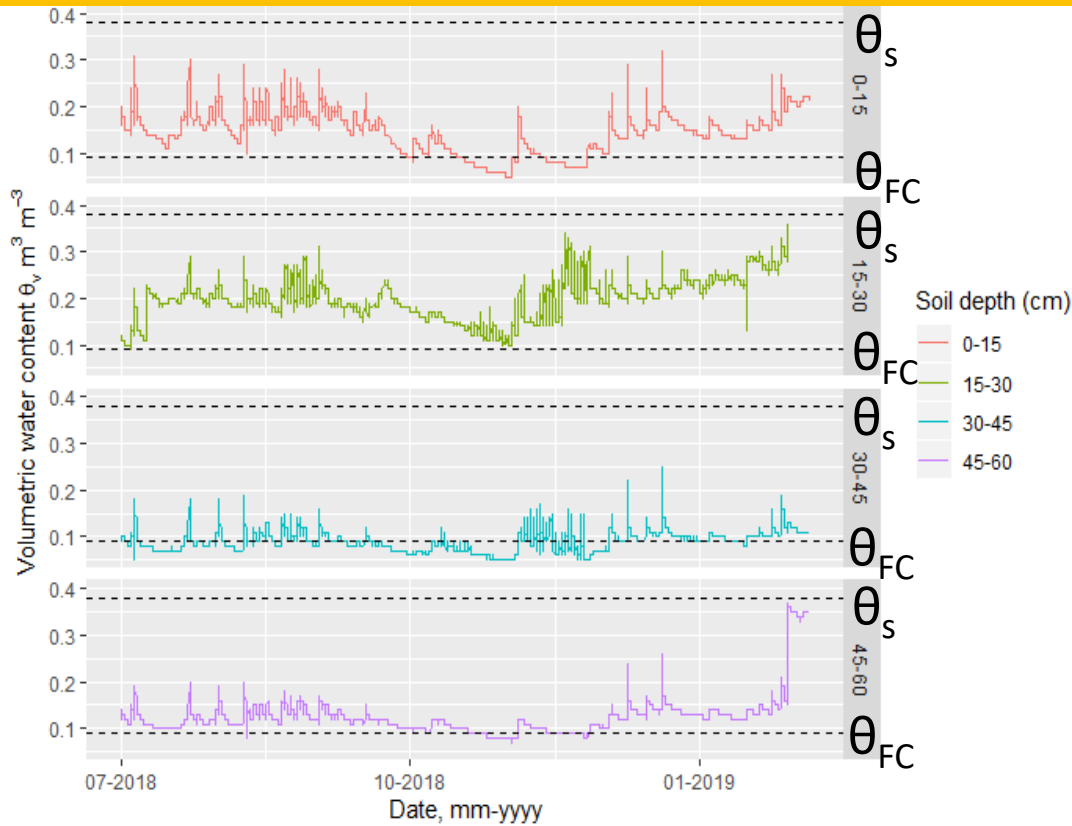
- Provide more water and nutrients for timely plant recovery when faced with windy conditions, hail damage and damage caused by rapid temperature shifts.
- Organic amendments increase soil organic matter content and offer many benefits. Over time, organic matter improves soil aeration, water infiltration, and both water- and nutrient-holding capacity.

# SOIL MOISTURE MEASUREMENTS USING CAPACITANCE PROBES



Water monitoring at grove scale and soil moisture measurement at 6-, 12- and 24-inch soil depths

# IRRIGATION MANAGEMENT FOR CITRUS

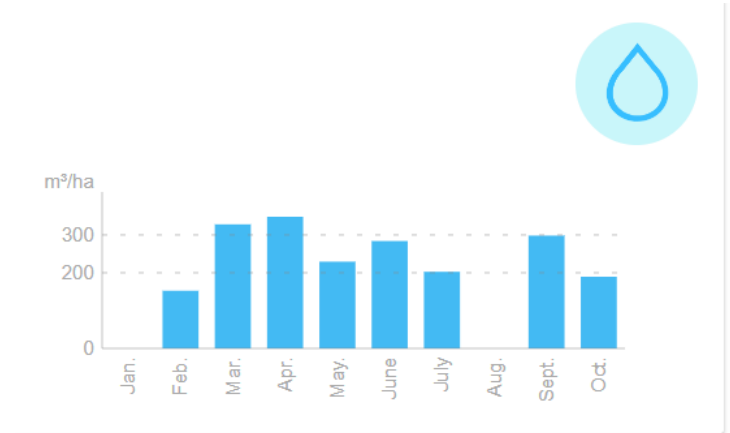
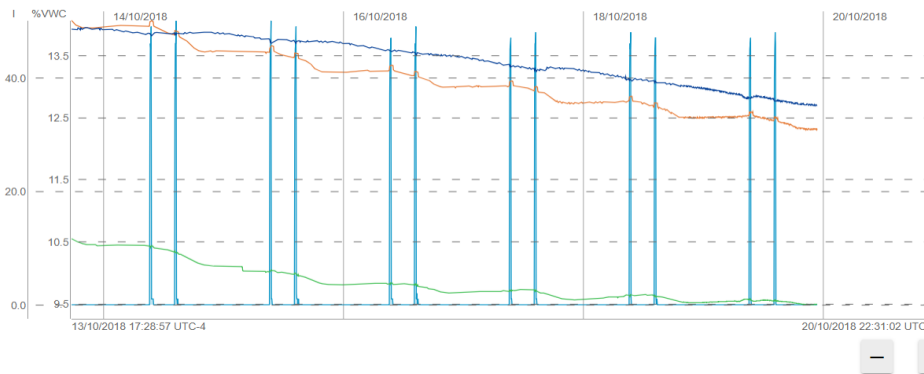


Soil moisture remained above field capacity at 0-6-inch, 6-24-inch depth most of the time and close to field capacity at 12-18-inch depth



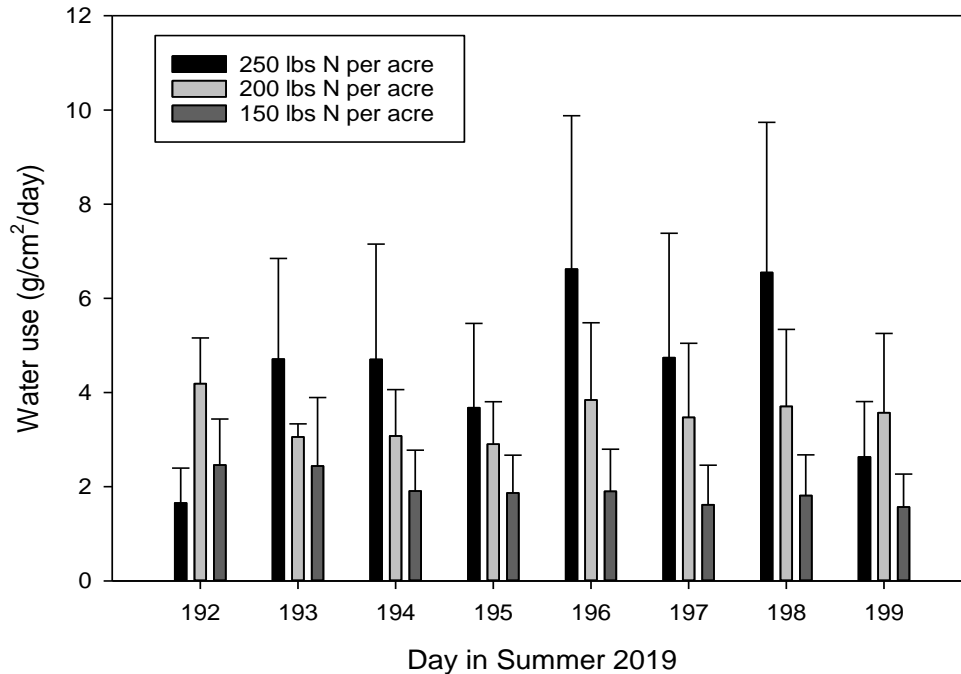
# IRRIGATION MANAGEMENT FOR CITRUS TREES (2)

Water monitoring at grove scale and soil moisture distribution at 6, 12, and 24-inch soil depths



~217,238 gal/acre between Feb 2018 to October 2018

# IMPROVED WATER USE EFFICIENCY WITH GOOD NITROGEN MANAGEMENT



Daily irrigation could help in managing HLB affected trees and reduce tree water stress with optimal fertilization.

# Use of selected sensors for irrigation decisions on sandy soils

## Field Health Report for 01/19/2020



operations@aquaspy.com

To Kadyampakeni, Davie M

Reply

Reply All

Retention Policy Inbox UF (3 years)

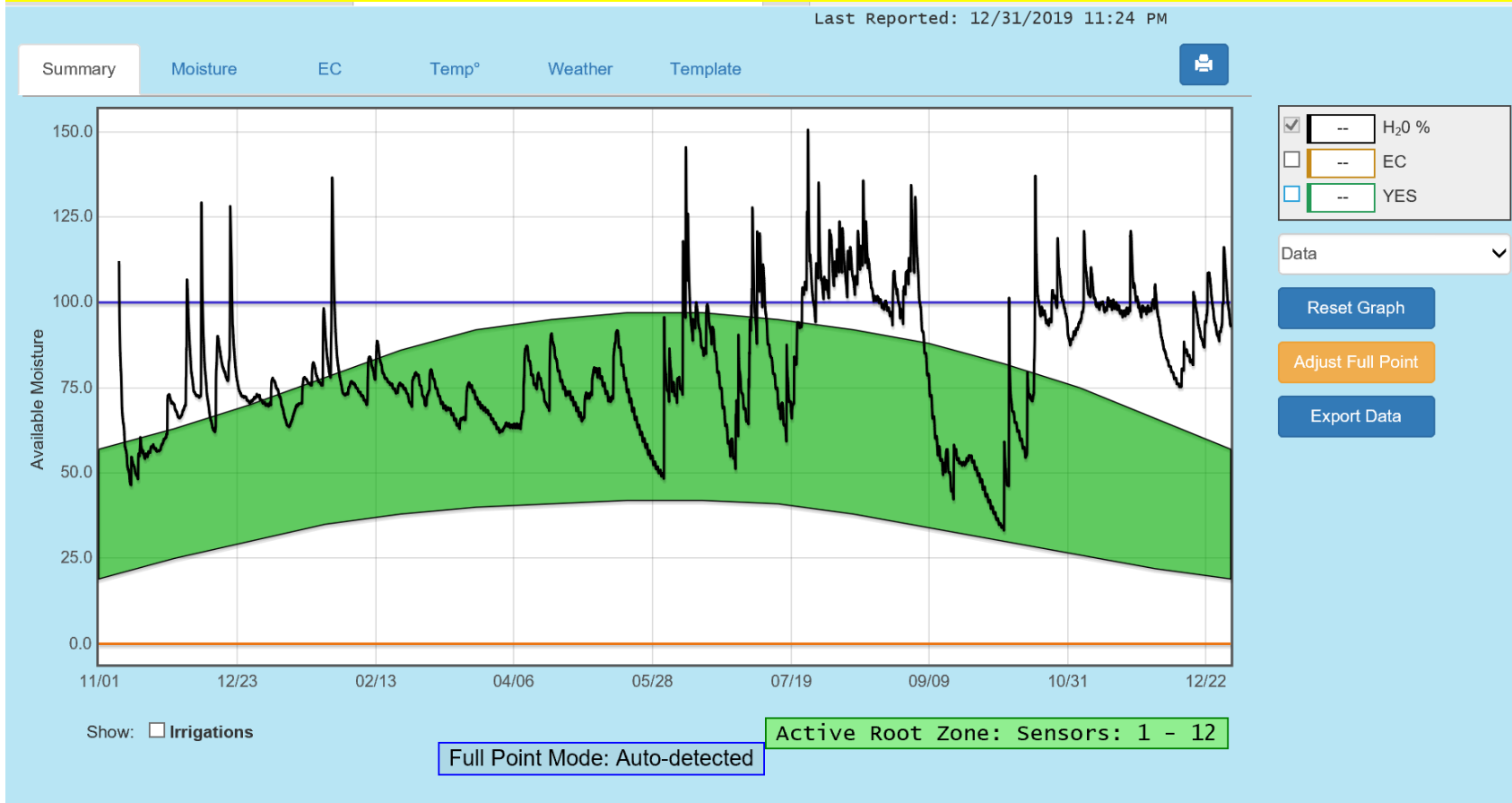
Expires 1/18/2023

[If there are problems with how this message is displayed, click here to view it in a web browser.](#)

Subscriber	Site	Plant Date	Crop Type	Moisture	Last Irrigation	Days Until Empty	Root Depth
University of Florida	<a href="#">(14704) U. of Florida Block 22 Row 14 Citrus 2020</a>	01/01/2020	Citrus	Optimum 55.2 %	01/04/2020 12"	17.9	48"
University of Florida	<a href="#">(14706) U. of Florida Block 22 Row 15 Citrus 2020</a>	01/01/2020	Citrus	Above Optimum 63.8 %	01/04/2020 16"	21+	48"
University of Florida	<a href="#">(14707) U. of Florida Block 22 row 16 Citrus 2020</a>	01/01/2020	Citrus	Optimum 42.6 %	01/04/2020 24"	21+	48"
University of Florida	<a href="#">(14708) U. of Florida Block 22 row 18 Citrus 2020</a>	01/01/2020	Citrus	Optimum 44.7 %	01/04/2020 12"	16.2	48"
University of Florida	<a href="#">(14709) U. of Florida Block 22 row 20 Citrus 2020</a>	01/01/2020	Citrus	Optimum 60.0 %	01/04/2020 12"	21+	48"

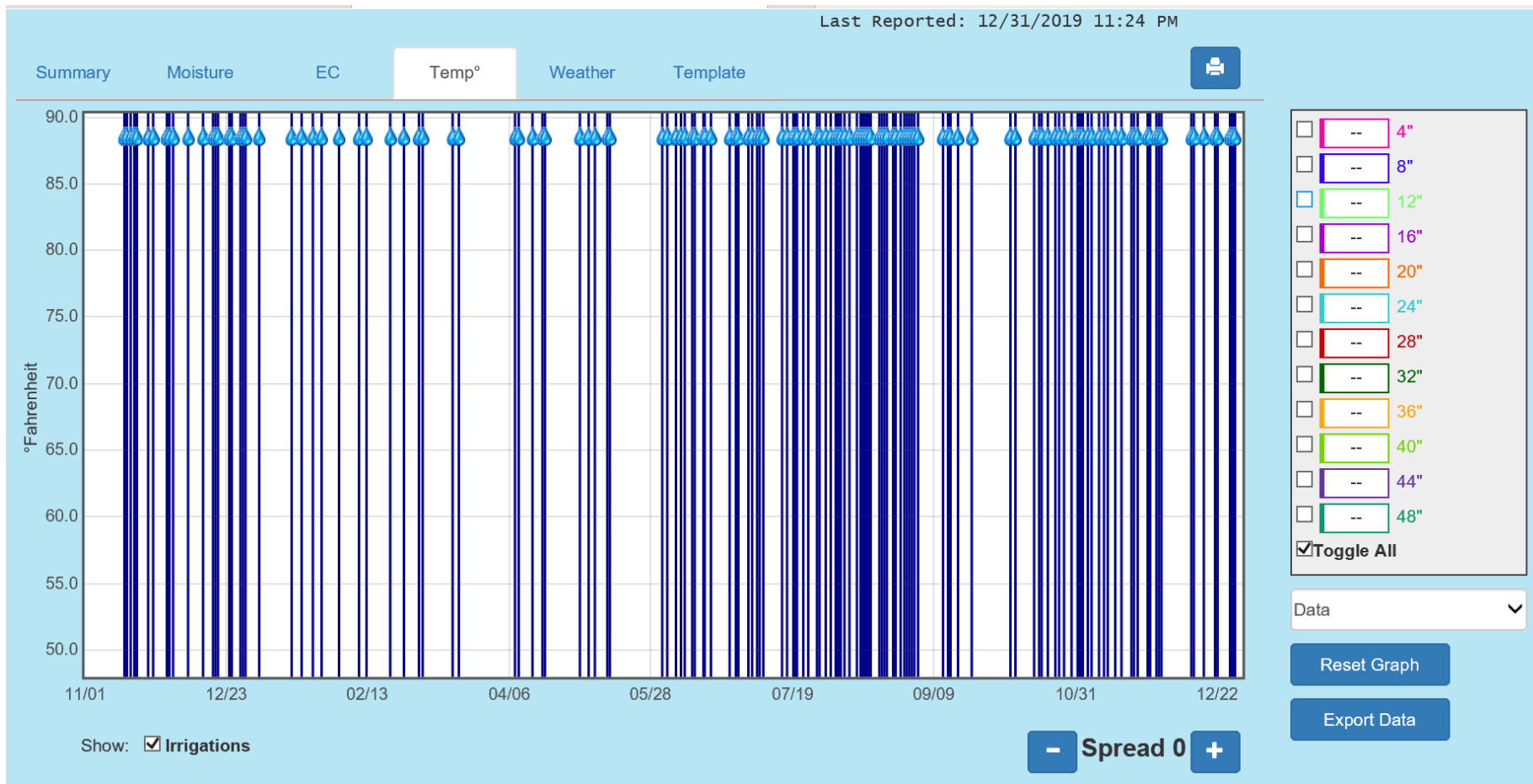
# Soil moisture, soil temperature and electrical conductivity data

Green zone is for adequate soil moisture in the root zone; black line is for average soil moisture, blue line is for optimal water content in the profile.



# Irrigation monitoring along with soil parameter data collection

Irrigation events monitored with sensors.



# Soil moisture data monitored from 4 to 48 inches. Red line is for field capacity.

Last Reported: 12/31/2019 11:24 PM

Summary

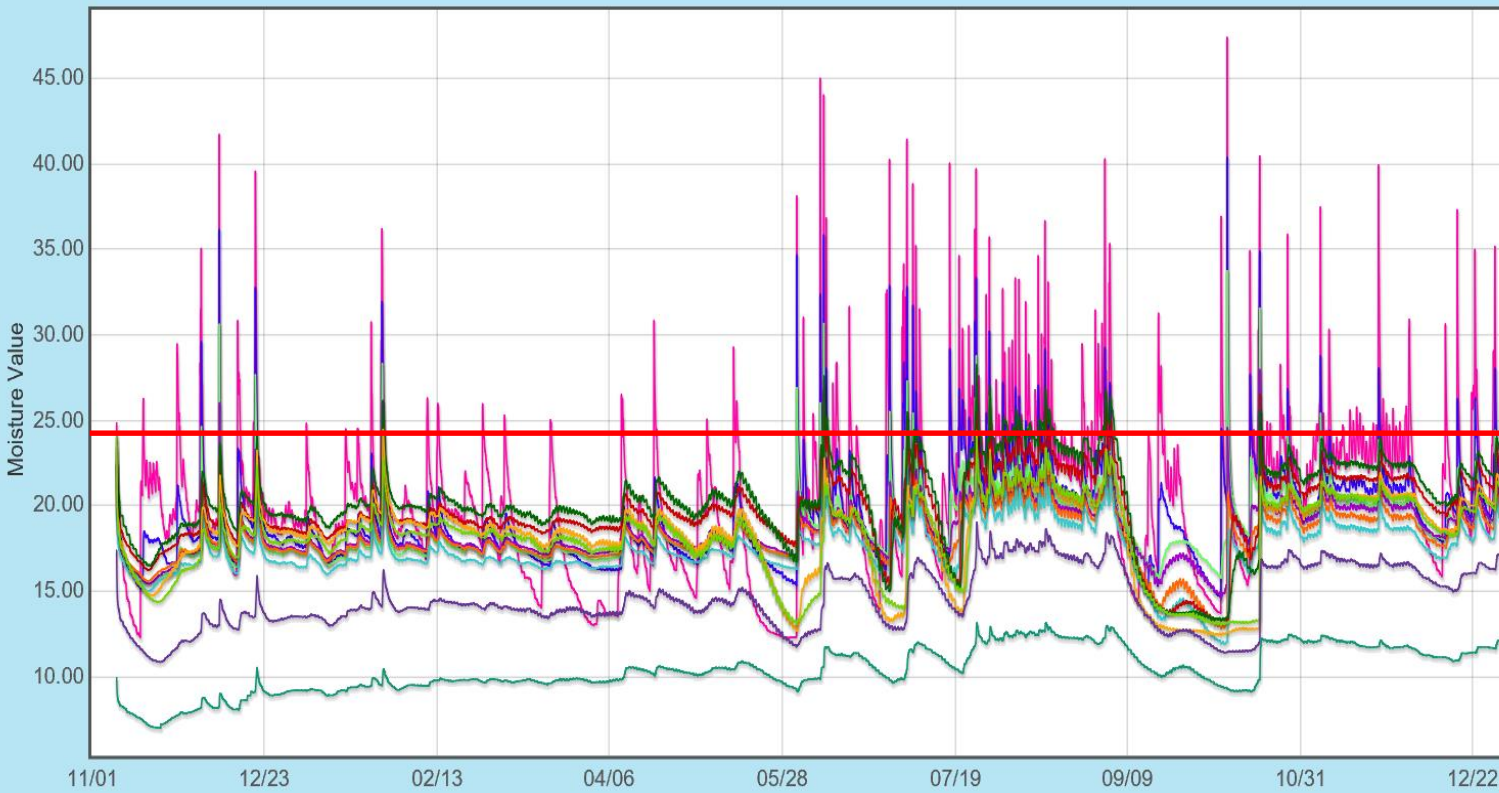
Moisture

EC

Temp°

Weather

Template



- °F
- 4"
- 8"
- 12"
- 16"
- 20"
- 24"
- 28"
- 32"
- 36"
- 40"
- 44"
- 48"
- Toggle All

Data ▾

Reset Graph

Export Data

Show:  Irrigations

- Spread 0 +

# Soil moisture data monitored at 4, 12, 20, 44 and 48 inches. Red line is for field capacity.

Last Reported: 12/31/2019 11:24 PM

Summary

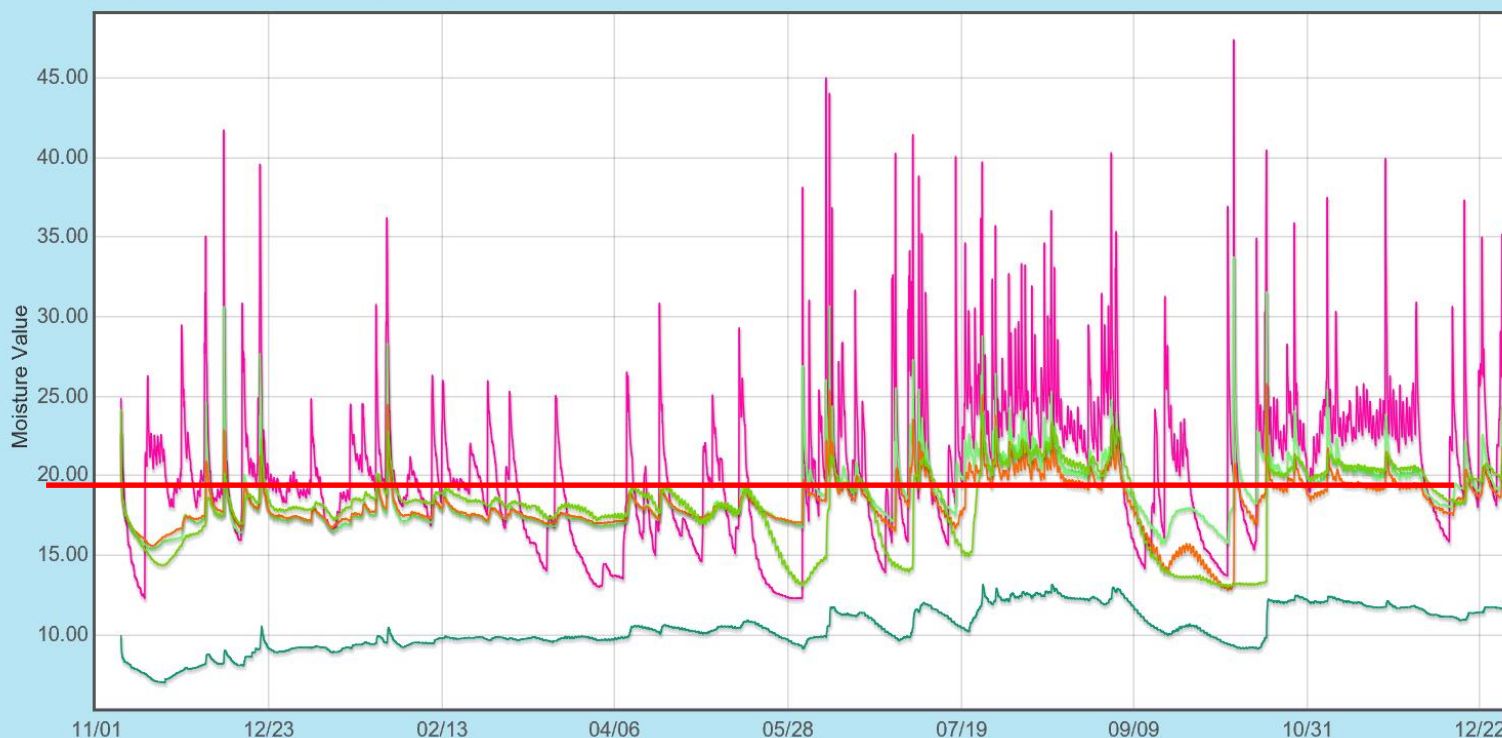
Moisture

EC

Temp°

Weather

Template



- °F
- 4"
- 8"
- 12"
- 16"
- 20"
- 24"
- 28"
- 32"
- 36"
- 40"
- 44"
- 48"
- Toggle All

Data

Reset Graph

Export Data

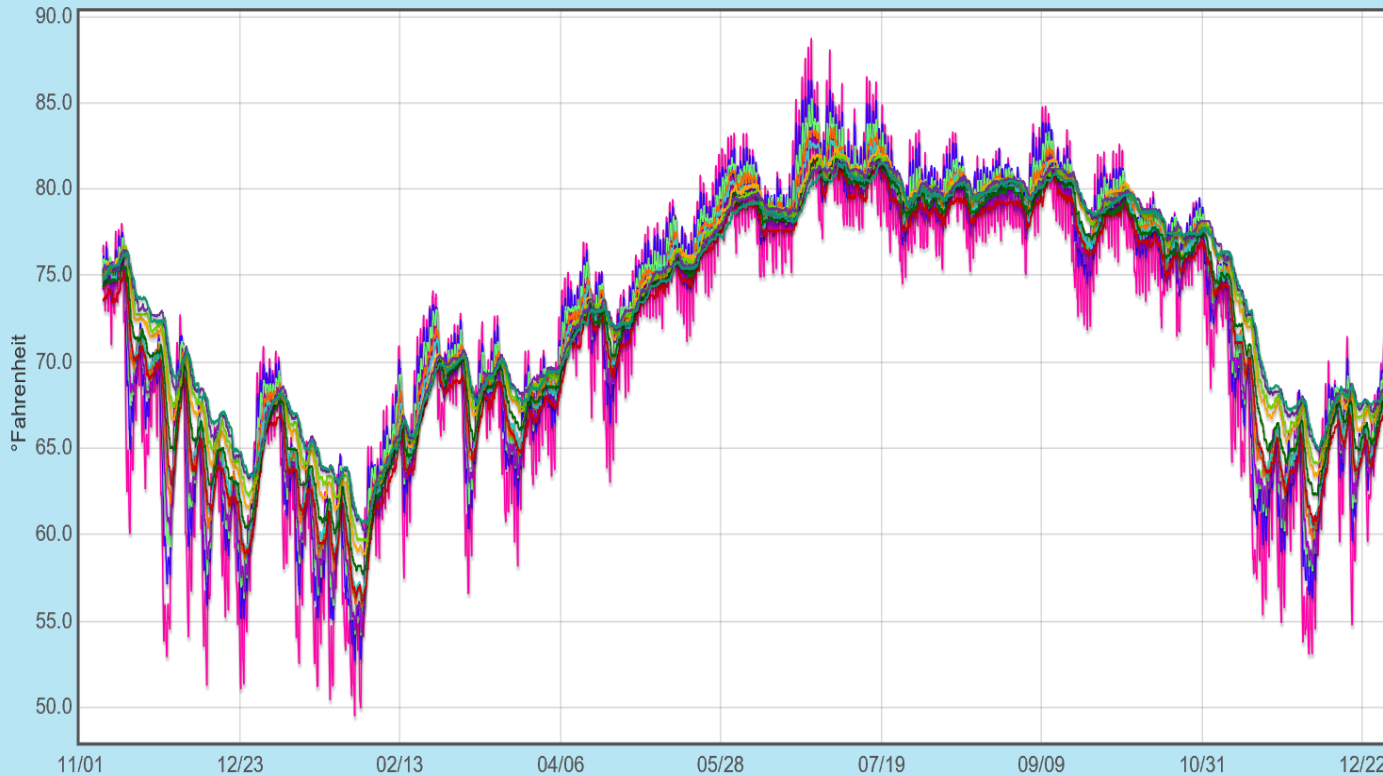
Show:  Irrigations

- Spread 0 +

# Soil temperature data tracked from 4 to 48 inches

Last Reported: 12/31/2019 11:24 PM

Summary Moisture EC **Temp°** Weather Template



- 4"
- 8"
- 12"
- 16"
- 20"
- 24"
- 28"
- 32"
- 36"
- 40"
- 44"
- 48"
- Toggle All

Data

Reset Graph

Export Data

Show:  Irrigations

- Spread 0 +

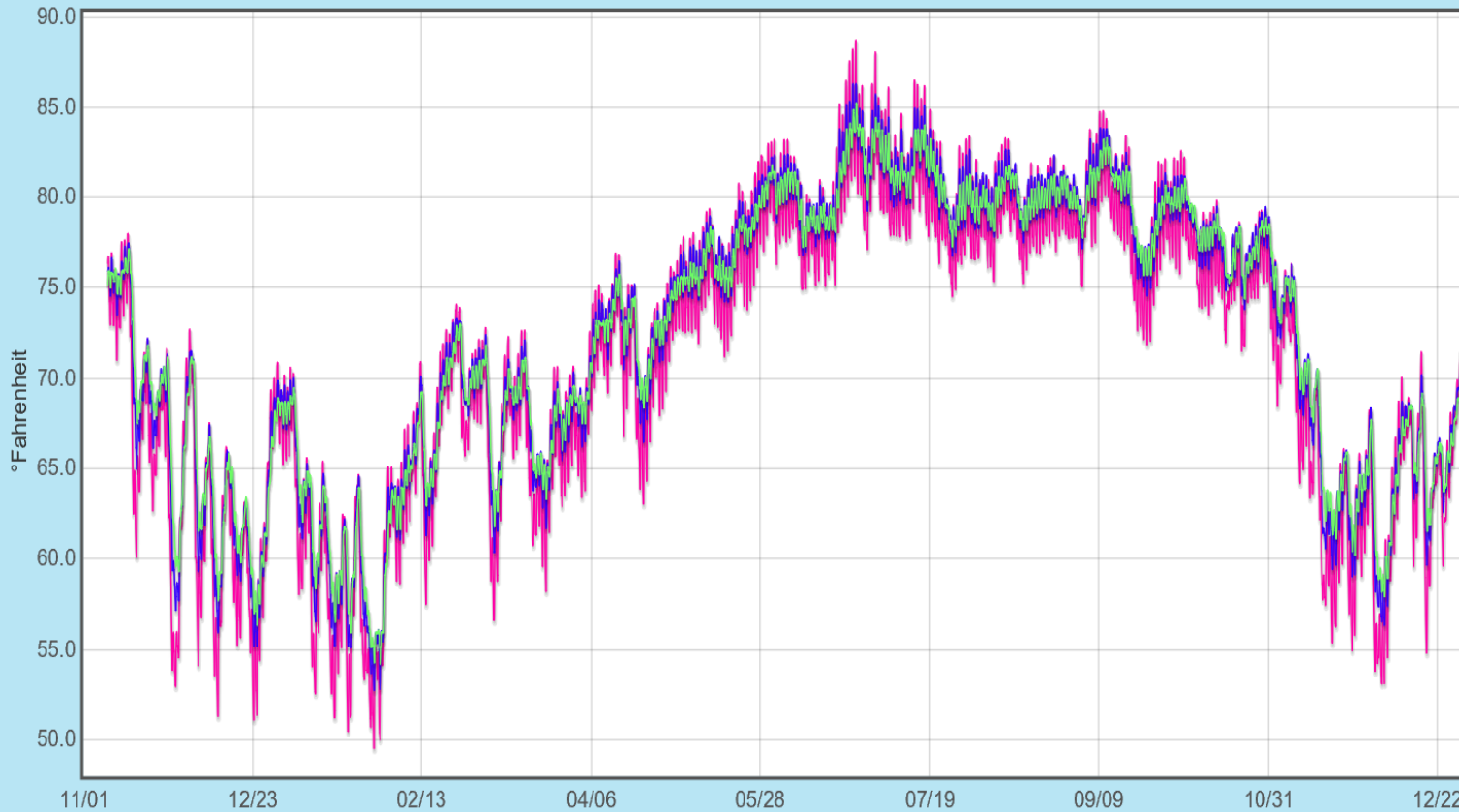


# Soil temperature data 4, 8, 12, and 48 inches.

Thu Nov 15 2018 01:00 PM (Eastern Standard Time)

Last Reported: 12/31/2019 11:24 PM

Summary Moisture EC **Temp°** Weather Template



- 72.9 4"
- 75.3 8"
- 75.9 12"
- 75.4 16"
- 76.3 20"
- 76.2 24"
- 75.1 28"
- 75.5 32"
- 76.4 36"
- 76.5 40"
- 76.4 44"
- 76.1 48"
- Toggle All

Data ▼

Reset Graph

Export Data

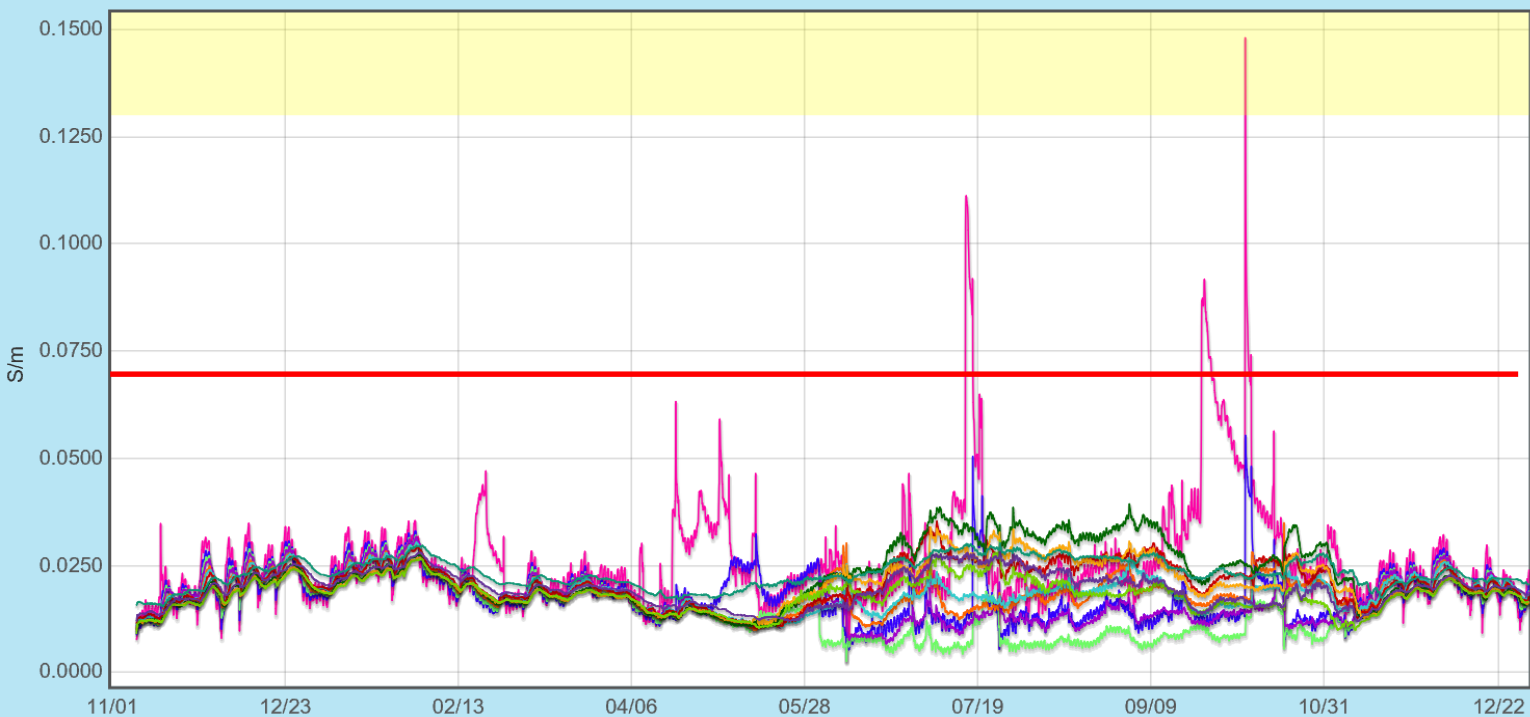
Show:  Irrigations

- Spread 0 +

Soil electrical conductivity (EC) data monitored from 4 to 48 inches. Red line is for maximum EC to be observed for the sensor of interest.

Last Reported: 12/31/2019 11:24 PM

Summary Moisture **EC** Temp° Weather Template



- 4"
- 8"
- 12"
- 16"
- 20"
- 24"
- 28"
- 32"
- 36"
- 40"
- 44"
- 48"
- Toggle All

Data

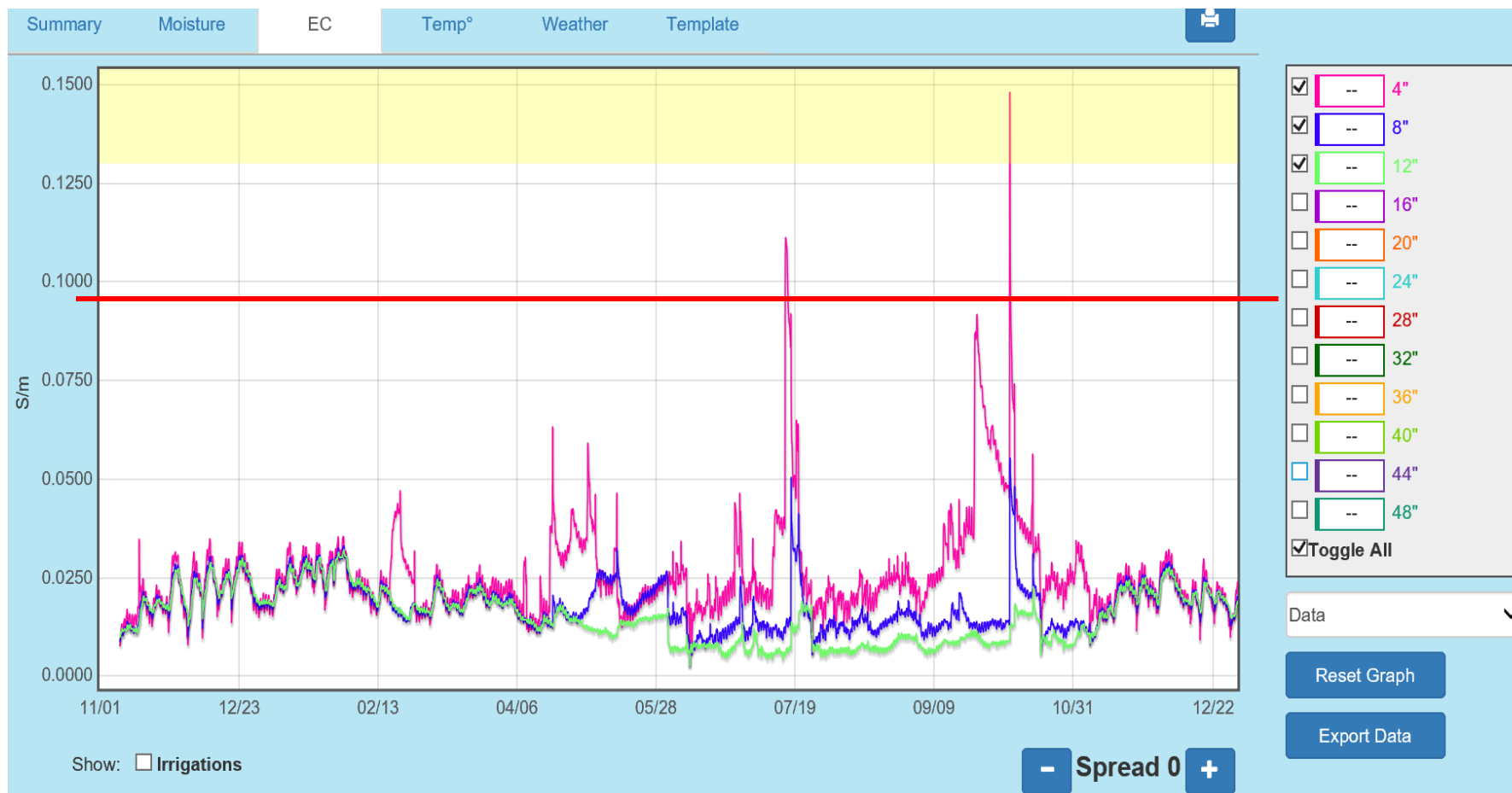
Reset Graph

Export Data

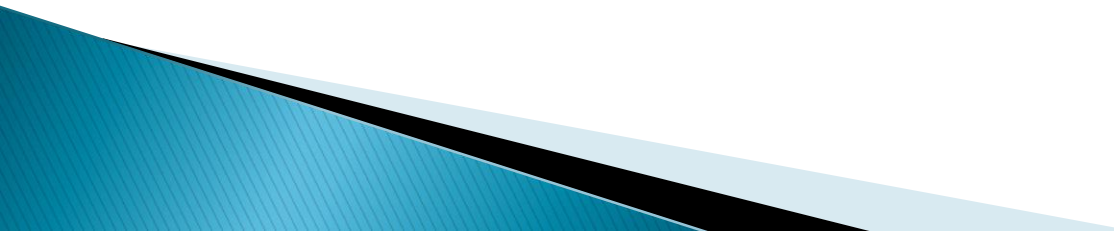
Show:  Irrigations

- Spread 0 +

Soil electrical conductivity data at 4, 8, and 12-inch depths. Red line is for maximum EC to be observed for the sensor of interest.



# Conclusions

- Use of cover crops and compost would improve tree performance at different frequent irrigation rates on Florida sandy soils.
  - Improved irrigation management achieved with the aid of soil moisture sensors of different types.
  - Monitoring of nutrient movement also possible with use of sensors that track salinity.
- 

# Acknowledgements to USDA MAC CRDF Cover Crop Project for Funding and my program team



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# QUESTIONS/COMMENTS?



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